DEPARTMENT OF NOTES, REVIEWS, ETC.

It is the purpose, in this department, to present from time to time brief original notes, both of methods of work and of results, by members of the Society. All members are invited to submit such items. In the absence of these there will be given a few brief abstracts of recent work of more general interest to students and teachers. There will be no attempt to make these abstracts exhaustive. They will illustrate progress without attempting to define it, and will thus give to the teacher current illustrations, and to the isolated student suggestions of suitable fields of investigation.—[Editor.]

AMATEUR MICROSCOPISTS

The following group of four notes, by Mr. Roberts, represent work done by an enthusiastic photographer, who is greatly interested in studying and photographing histological and cytological conditions. They represent a type of worker and of work which the American Microscopical Society wishes to encourage. So much expert work is done with the microscope in our great laboratories that too many students come to feel that good work cannot be done away from them. It is the hope that amateur workers will come more and more to use this department, and make it helpful to other amateurs.

I. NOTES ON RHIZOPODS FROM MICHIGAN

During the summer of 1912 monthly collections at the same locality were made. These collections were killed and fixed at early morning hours, stained in iron-hematoxylin, dehydrated and carried into xylol. Some of the material was mounted whole in balsam and other portions imbedded and sectioned.

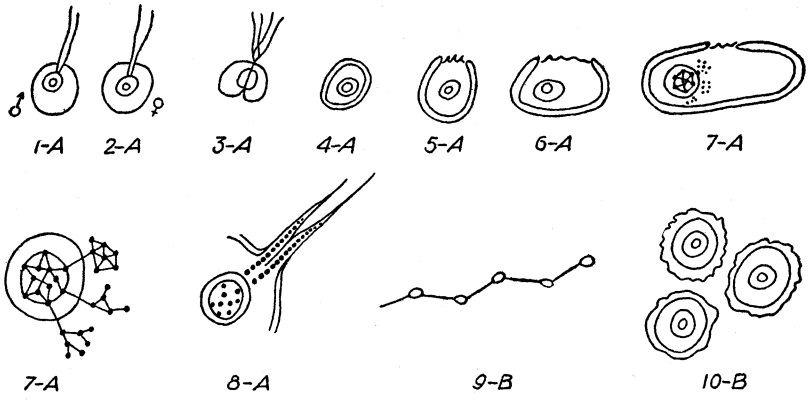
Many varieties were studied, but the common *Arcella vulgaris* was the easiest material for observation, both on account of its shape, ease of identification and number of individuals found.

The Arcella is very polymorphic in form, and has a number of different life phases which are not altogether understood.

The life cycle is a year in length, and the majority of individuals arrive at sexual maturity in May and June. From then onward only straggling mature individuals are found.

The ordinary method of propagation is by gametes. These are furnished with a pair of flagella by which they move about. See

Fig. 1-A and 2-A. These gametes are macro- or female, and micro- or male. They conjugate and form a new individual which, after a resting stage, develops into a mature Arcella. Along in October the young individuals begin to form the chromidial net from which the future generations are cut out.



1-A. Arcella—male gamete.
2-A. Arcella—female gamete.
3-A. Arcella—conjugation of gametes.
4-A. Arcella—resting stage.
5-A. Arcella—early vegetating stage.
6-A. Arcella—later vegetating stage.
7-A. Arcella—showing details of chromidial net formation.
There are 12 chromosomes which bud out chromidia into the cytoplasm, these subdivide and form the net.
8-A. Arcella—showing the formation of the flagella fibrils from the centrosomes.
9-B. Clathrulina in asexual series.
10-B. Clathrulina in resting spore stage—asexual.

This stage was observed as shown in Fig. 7-A in the diagrams. Certain chromidial bodies are budded out from the nucleus into the cytoplasm, where they undergo repeated subdivisions until their progeny form a dense network of deeply staining granules connected by threads which follow the divisions. This process continues slowly until the warmth of Spring hastens feeding, which increases nourishment and brings the metabolism of the organism to a climax.

When the net is fully formed it undergoes constrictions in the night, forming at intervals masses of the chromidial granules. See

Figs. 1 and 2, Plate X. The inclosed granules now bud out a certain number of granules which unite and form a nucleus for the mass.

The formation of the flagella by repeated divisions of centrosome bodies was observed. This agrees in all essential details with the later observations of the origin of motile organs on various type of plant and animal sperms. See text figure 8-A.

This end, bearing the flagella, is the mouth end of the adult rhizopods, so that in all forms, both naked and shelled, there is always a definite polarity or relation of the nucleus and cytoplasm. See Fig. 5-A.

The Rhizopods are now considered to be degenerate flagellates. The flagellate gamete stage gives the clue to their line of descent.

These sexual gametes escape when mature, leaving temporary scars in the matrix in which they were bedded, as is shown in Fig. 3, Plate X.

There was seen occasionally an alternate sexual generation, or process of schizogony. This stage or form is produced by the constriction of the chromidial net into masses. These masses have at this stage no nuclei, each mass being inclosed by a network of regularly placed granules connected by threads. These granules, bud inward, forming granules which group and form the new nucleus, while they themselves form the cytoplastids, or vegetative systems. See Fig. 4, Plate X.

Thus we see the cell formation processes reversed from the common method of budding from the nucleus outward. This seems to the writer to show that the chromidial elements of the cytoplasm are of the same rank as the nuclear chromidia, being capable of reversing their generations in either direction.

This seems to represent a degenerate function which is only repeated at rare intervals, as but very few are to be found.

Then there is a process of blastogamy, in which an individual deserts its shell and unites with another individual in its shell, the two forming a joint network. This chromidial mass later breaks up into swarm spores.

The peculiar markings on the chitinous shell are produced by cyto-somes, which take nuclear stains, and the membrane on which

the chitin is deposited is easily observed in many specimens where the individual is shrunken away from the wall by the reagents.

Many fine specimens of our only form of fresh water Polycistinæ, the Clathrulina, were found, and several interesting phases of their life history studied.

They form a fenestrated silicious shell on a long stalk, as shown in Fig. 5, Plate X. An interesting phase of their asexual reproduction was observed. The body divides, part escaping from the shell. This part then forms a new shell for itself. The stalk of the new individual forms in attachment to the old shell, and by growth gradually elongates until adult size is reached when the process is again repeated. As many as eight individuals were found thus formed a series. See text figure 9-B.

They also reproduce sexually by motile macro- and microgametes, which escape and conjugate and after a resting stage follow the usual route to maturity.

An interesting asexual stage was found, the body breaking down into three stellate resting spores, much resembling those of Desmids. See Fig. 6, Plate X. The cell wall is dissolved and the spores escape and are found in abundance in the mud.

As late as October they still remain in this stage, very likely spending most of the winter thus. Early Spring collections ought to show good stages of their development.

2. SPECULATIONS ON THE NATURE OF THE OLFACTORY ORGANS

In the vast families of insects and among other nearly related animals are found certain organs called antennæ. These are situated on the head and are generally conceded to be modified limbs, of which each segment of these forms of bodies once possessed a pair.

Such a modified pair of legs from a Black Syrphus Fly is shown in Fig. 1, Plate XI. Here, at least three segments of the limb remain. The second segment is greatly expanded laterally, forming a bulb much flattened, to which is attached the third segment in the form of a long whip-like filament.